narda
Safety Test Solutions
an L3 Communications Company
http://www.narda-sts.it

NARDA
Safety
Test
Solutions
S.r.l. Socio Unico

Sales & Support:
Via Leonardo da Vinci, 21/23
20090 Segrate (MI) - ITALY
Tel.: +39 02 2699871
Fax: +39 02 26998700

Manufacturing Plant:
Via Benessea, 29/B
17035 Cisano sul Neva (SV)
Tel.: +39 0182 58641
Fax: +39 0182 586400

User's Manual

PMM L3-32
PMM L3-64
PMM L3-100
PMM L3-500

ARTIFICIAL MAINS NETWORKS

SERIAL NUMBER OF THE INSTRUMENT
You can find the Serial Number on the rear panel of the instrument.
Serial Number is in the form: 0000X00000.
The first four digits and the letter are the Serial Number prefix, the last five digits are the Serial Number suffix. The prefix is the same for identical instruments, it changes only when a configuration change is made to the instrument.
The suffix is different for each instrument.

Document L3EN-70206 - Copyright © NARDA 2007

NOTE:

If the instrument is used in any other way than as described in this Users Manual, it may become unsafe

Before using this product, the related documentation must be read with great care and fully understood to familiarize with all the safety prescriptions.

To ensure the correct use and the maximum safety level, the User shall know all the instructions and recommendations contained in this document.

This products are a **Safety Class I** and **Installation Category II** instrument according to IEC classification and has been designed to meet the requirements of EN61010-1 (Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use).

This product has a **Pollution Degree II** normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.

The information contained in this document is subject to change without notice.

KEY TO THE ELECTRIC AND SAFETY SYMBOLS:

You now own a high-quality instrument that will give you many years of reliable service. Nevertheless, even this product will eventually become obsolete. When that time comes, please remember that electronic equipment must be disposed of in accordance with local regulations. This product conforms to the WEEE Directive of the European Union (2002/96/EC) and belongs to Category 9 (Monitoring and Control Instruments). You can return the instrument to us free of charge for proper environment friendly disposal. You can obtain further information from your local Narda Sales Partner or by visiting our website at www.narda-sts.it .

Warning, danger of electric shock

Read carefully the Operating Manual and its instructions, pay attention to the safety symbols.

Earth Protection

Earth

Unit Earth Connection

Equipotential

KEY TO THE SYMBOLS USED IN THIS DOCUMENT

DANGER **The DANGER sign draws attention to a potential risk to a person's safety. All the precautions must be fully understood and applied before proceeding.**

WARNING **The WARNING sign draws attention to a potential risk of damage to the apparatus or loss of data. All the precautions must be fully understood and applied before proceeding.**

CAUTION **The CAUTION sign draws attention against unsafe practices for the apparatus functionality.**

NOTE: **The NOTE draw attention to important information.**

Contents

	Page
Safety considerations and instructions	IV
EC Conformity Certicate PMM L3-32	VI
EC Conformity Certicate PMM L3-64	VII
EC Conformity Certicate PMM L3-100	VIII
EC Conformity Certicate PMM L3-500	IX

1 General Information	**Page**
1.1 Documentation	1-1
1.2 Introduction to PMM Artificial Mains Network	1-1
1.3 PMM Artificial Mains Networks for "CURRENT INJECTION" test	1-2
1.4 Shipping components	1-3
1.5 Environment	1-3
1.6 Return for service	1-3
1.7 Equipment cleaning	1-3

2 PMM L3-32	**Page**
2.1 Main specifications	2-1
2.2 Front and Rear panels	2-2
2.3 Network schematic diagram	2-3

3 PMM L3-64	**Page**
3.1 Main specifications	3-1
3.2 Front and Rear panels	3-2
3.3 Network schematic diagram	3-3

4 PMM L3-100	**Page**
4.1 Main specifications	4-1
4.2 Front and Rear panels	4-2
4.3 Network schematic diagram	4-3

5 PMM L3-500	**Page**
5.1 Main specifications	5-1
5.2 Front and Rear panels	5-2

6 Installation	**Page**
6.1 Introduction	6-1
6.2 Initial inspection	6-1
6.3 Packing unpacking	6-1
6.4 Preparation for use	6-2
6.5 Pilot Circuit	6-2
6.6 Installation check list	6-3

7 Operating PMM Artificial Mains Networks	**Page**
7.1 Operating PMM Networks	7-1
7.2 Test Set-Up Considerations	7-2
7.3 Network verification and maintenance	7-3
7.4 Remote control	7-4

Figures

Figure		Page
1-1	CISPR 16 equivalent circuit	1-2
2-1	PMM L3-32 Front Panel	2-2
2-2	PMM L3-32 Rear Panel	2-2
2-3	PMM L3-32 Network schematic diagram	2-3
2-4	PMM L3-32 Network schematic diagram	2-4
2-5	PMM L3-32 Network schematic diagram	2-5
3-1	PMM L3-64 Front Panel	3-2
3-2	PMM L3-64 Rear Panel	3-2
3-3	PMM L3-64 Network schematic diagram	3-3
3-4	PMM L3-64 Network schematic diagram	3-4
4-2	PMM L3-100 Front Panel	4-2
4-2	PMM L3-100 Rear Panel	4-2
4-3	PMM L3-100 Network schematic diagram	4-3
4-4	PMM L3-100 Network schematic diagram	4-4
5-2	PMM L3-500 Front Panel	5-2
5-3	PMM L3-500 Rear Panel	5-3
6-1	Pilot circuit connection example	6-2
7-1	Typical test set-up	7-2

Tables

Table		Page
2-1	Main Specifications PMM L3-32	2-1
3-1	Main Specifications PMM L3-64	3-1
4-1	Main Specifications PMM L3-100	4-1
5-1	Main Specifications PMM L3-500	5-1

SAFETY RECOMMENDATIONS AND INSTRUCTIONS

This product has been designed, produced and tested in Italy, and it left the factory in conditions fully complying with the current safety standards. To maintain it in safe conditions and ensure correct use, these general instructions must be fully understood and applied before the product is used.

- Over current protection is not provided in the LISN. The LISN must be connected to a power mains which has the properly rated mains protection installed.
- When the device must be connected permanently, first provide effective grounding;
- If the device must be connected to other equipment or accessories, make sure they are all safely grounded;
- In case of devices permanently connected to the power supply, and lacking any fuses or other devices of mains protection, the power line must be equipped with adequate protection commensurate to the consumption of all the devices connected to it;
- In case of connection of the device to the power mains, make sure before connection that the voltage selected on the voltage switch and the fuses are adequate for the voltage of the actual mains;
- Devices in Safety Class I, equipped with connection to the power mains by means of cord and plug, can only be plugged into a socket equipped with a ground wire;
- Any interruption or loosening of the ground wire or of a connecting power cable, inside or outside the device, will cause a potential risk for the safety of the personnel;
- Ground connections must not be interrupted intentionally;
- To prevent the possible danger of electrocution, do not remove any covers, panels or guards installed on the device, and refer only to NARDA Service Centers if maintenance should be necessary;
- To maintain adequate protection from fire hazards, replace fuses only with others of the same type and rating;
- Follow the safety regulations and any additional instructions in this manual to prevent accidents and damages.
- The probe cannot be handled in proximity of high voltage mains line.
- If the probe is to be connected to high voltage mains line a safety interlock equipment must be installed to ensure the mains line be switched off before any probe handling or connection
- The user must provide a safety protection cover with a low voltage interlock switch able to cut off mains voltage before probe handling or connection.

EC Conformity Certificate

(in accordance with the Directives: EMC 89/336/EEC and Low Voltage 73/23/EEC)

This is to certify that the product: PMM L3-32 Artificial Mains Network

Produced by: NARDA S.r.l.
Safety Test Solution
Via Benessea 29/B
17035 Cisano sul Neva (SV) – ITALY

complies with the following European Standards :
Safety: EN 61010-1:1993 + A2:1995
EMC: EN 55011 - EN 50082-1

This product complies with the requirements of Low Voltage Directive 73/23/EEC, amended by 93/68/EEC, and the EMC Directive 89/336/EEC amended by 92/31/EEC, 93/68/EEC, 93/97/EEC.

NARDA S.r.l.

EC Conformity Certificate

(in accordance with the Directives: EMC 89/336/EEC and Low Voltage 73/23/EEC)

This is to certify that the product: L3-64 Artificial Mains Network

Produced by: NARDA S.r.l.
Safety Test Solution
Via Benessea 29/B
17035 Cisano sul Neva (SV) – ITALY

complies with the following European Standards :
Safety: EN 61010-1:1993 + A2:1995
EMC: EN 55011 - EN 50082-1

This product complies with the requirements of Low Voltage Directive 73/23/EEC, amended by 93/68/EEC, and the EMC Directive 89/336/EEC amended by 92/31/EEC, 93/68/EEC, 93/97/EEC.

NARDA S.r.l.

EC Conformity Certificate

(in accordance with the Directives: EMC 89/336/EEC and Low Voltage 73/23/EEC)

This is to certify that the product: PMM L3-100 Artificial Mains Network

Produced by: NARDA S.r.l.
Safety Test Solution
Via Benessea 29/B
17035 Cisano sul Neva (SV) – ITALY

complies with the following European Standards :
Safety: EN 61010-1:1993 + A2:1995
EMC: EN 55011 - EN 50082-1

This product complies with the requirements of Low Voltage Directive 73/23/EEC, amended by 93/68/EEC, and the EMC Directive 89/336/EEC amended by 92/31/EEC, 93/68/EEC, 93/97/EEC.

NARDA S.r.l.

EC Conformity Certificate

(in accordance with the Directives: EMC 89/336/EEC and Low Voltage 73/23/EEC)

This is to certify that the product: PMM L3-500 Artificial Mains Network

Produced by: NARDA S.r.l.
Safety Test Solution
Via Benessea 29/B
17035 Cisano sul Neva (SV) – ITALY

complies with the following European Standards :
Safety: EN 61010-1:1993 + A2:1995
EMC: EN 55011 - EN 50082-1

This product complies with the requirements of Low Voltage Directive 73/23/EEC, amended by 93/68/EEC, and the EMC Directive 89/336/EEC amended by 92/31/EEC, 93/68/EEC, 93/97/EEC.

NARDA S.r.l.

This page has been left blank intentionally

X	**EC Conformity**

1 - General Information

1.1 Documentation

Enclosed with this manual are a service questionnaire to send back to NARDA in case of equipment service is needed, and an accessories check list to verify all accessories enclosed in the packaging.

1.2 Introduction to PMM Artificial Mains Networks

The objective of EMI Conducted tests is to define the amplitude of current I_c and Voltage V_c emission from the Device Under Test (DUT) onto the power mains or to define the immunity of the DUT to the conducted interference.
The mains lines themselves do not allow for reliable EMI measurements since their impedance is subject to marked variations that generates different test results at different test sites.
The PMM Artificial Mains Networks are LISN used for RFI measurements on AC three-phase, power supplied electric and electronic equipment usable from DC to 60 Hz.
The LISNs are three line V-network with an equivalent circuit of 50 ohm // (5ohm + 50μH), fully compliant with CISPR publ. 16, VDE 0876 and FCC part 15 regulation.
The LISNs are suited to perform measurements on conducted interference in the frequency range from 9 kHz to 30 MHz.
Designed according to criteria of cheaply and compactness they can be used together with PMM Systems for Conducted Interference or any other RF receiver.
The main functions performed by the Artificial Mains Network are:

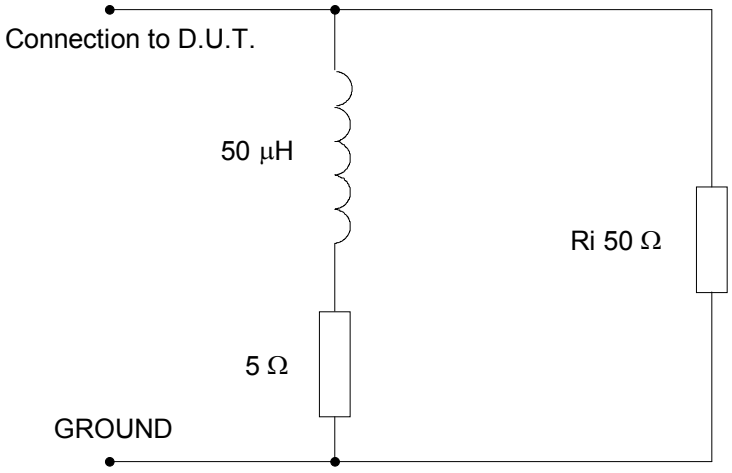
- terminate the DUT with a standardized impedance against reference ground;
- supply power to the DUT;
- insulate the test circuits against external interference coming, for example, from AC-voltage network;
- route the EMI (Electro Magnetic Interference) of the DUT to the receiver, in case of conducted emission measurement, and the EMI from the signal generator to the DUT, in case of susceptibility test (current injection).

The PMM LISNs are provided with a standard industrial power sockets, with a pilot conductor connector provided.
According to EN 60309 (IEC 309) Normative the pilot conductor can be used to operate a remote control switch, to avoid any mains connector operation with high current load.

Document L3EN-70206 - © NARDA 2007

1-3 PMM Artificial Mains Networks for "CURRENT INJECTION" test

As described above, a LISN is primarily a probe to take out RF signals. Some particular EMC recommendations might require that Device Under Test shall be proven to conducted EMC immunity in the range 10 kHz – 30 MHz, by injecting on the supply lines certain RF interference and checking the DUT's response.
PMM LISNs may be used also to this purpose by injecting a RF signal into the RF output connector on the front panel.
The following figure shows the CISPR equivalent circuit.



Ri = input impedance of the RFI

CISPR equivalent circuit

Fig. 1-1 CISPR équivalent circuit

1-4 Shipping components

PMM LISN Network is composed by the following parts:

- PMM LISN Network
- Operating Manual.
- LISN Control Cable
- RF Cable
- IEC Mains plug
- Certificate of compliance
- Return for repair form

1-5 Environment

The operating environment is specified to be within the following limitations:

- Temperature 0° to +40° C
- Humidity < 90% relative

The instrument should be stored in a clean, dry environment
The storage and shipping environment is specified to be within the following limitations :

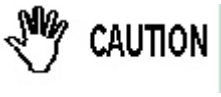
- Temperature -25° to + 75° C
- Humidity < 95% relative

1-6 Return for service

If the instrument should be returned to NARDA for service, please complete the service questionnaire enclosed with the Operating Manual and attach it to the instrument.
To minimize the repair time, be as specific as possible when describing the failure. If the failure only occurs under certain conditions, explain how to duplicate the failure.
If possible, reuse of the original packaging to ship the equipment is preferable.
In case other package should be used ensure to wrap the instrument in heavy paper or plastic.
Use a strong shipping container and use enough shock absorbing material around all sides of the equipment to provide a firm cushion and prevent movement in the container.
Seal the shipping container securely with shipment tape.
Mark the shipping container FRAGILE to encourage careful handling.

1-7 Equipment cleaning

Use a clean, dry non abrasive cloth for external cleaning of the equipment.



To clean the equipment do not use any solvent, thinner, turpentine, acid, acetone or similar matter to avoid damage to external plastic and surfaces.

This page has been left blank intentionally

2 – PMM L3-32

Table 2-1 lists the PMM L3-32 Network performance specifications.
The following conditions apply to all specifications:

- The ambient temperature must be 0° to 40°.

2-1 Main specifications

TABLE 2-1 Main specifications PMM L3-32

Electrical characteristics	Performance Limits
Frequency range:	9 kHz to 30 MHz
Maximum continuous rated output current:	IEC plug: 32 A Schuko plug: 16 A
Maximum operating voltage:	400 Volt AC
Input Mains frequency range:	DC - 60 Hz
Equivalent circuit:	50 Ohm // (5 Ohm + 50 μH)
RF output:	BNC female
Test item:	32 A IEC connector and 16A Schuko
Rated temperature:	0° to + 40° C
Storage temperature:	-25° to + 75° C
Overall dimension mm (W x H x D):	342 x 254 x 370
Weight:	16.5 kg

Document L3EN-70206 - © NARDA 2007

2-2 Front and Rear Panels

In Fig. 2-1 and Fig. 2-2 you can see front and rear connecting points and terminals of PMM L3-32 Network.

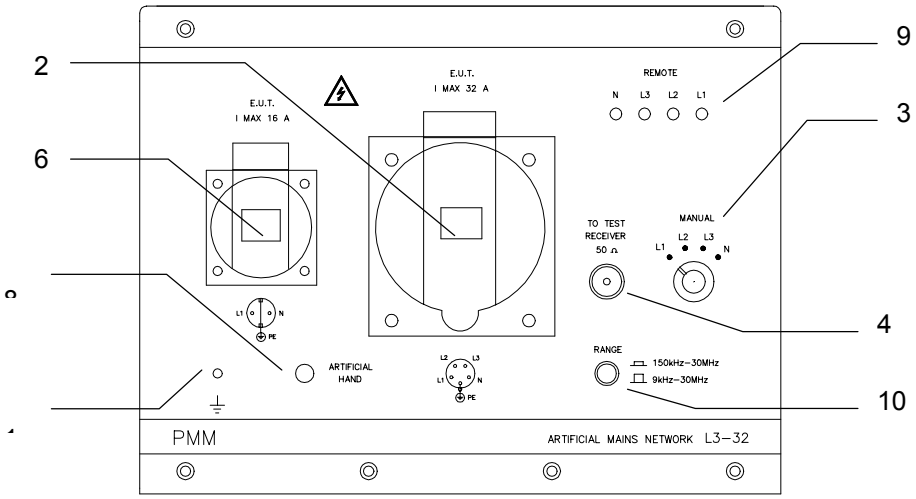


Fig. 2-1 Front Panel

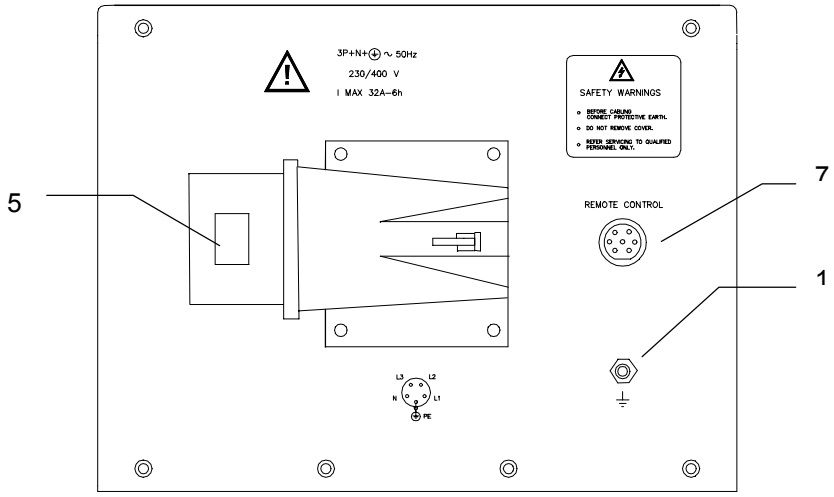


Fig. 2-2 Rear Panel

Legend:

1- Ground contact

2- Mains supply to DUT 32A

3- Manual switch for phase under test (With PMM receivers the switch is disabled and the switching is automatic)

4- RF output to EMI Signal Analyzer (50 ohm, BNC female connector)

5- Mains LISN supply.

6- Mains supply to DUT 16A Schuko

7- Remote receiver control connector

8- Artificial hand.

9- Line under test indicating led.

10- Filter 150kHz-30MHz

2-3 Network schematic diagram

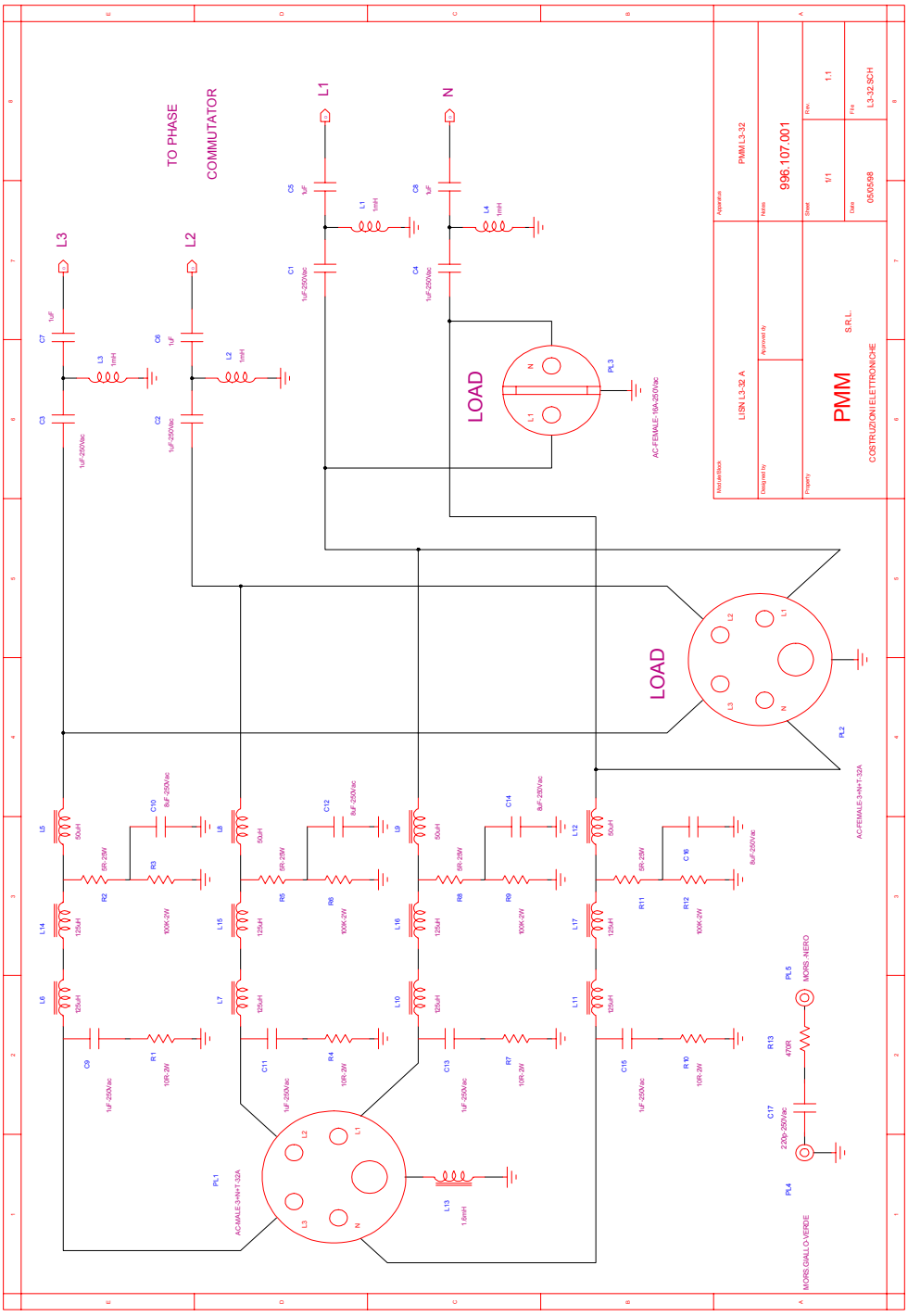


Fig. 2-3 Network schematic diagram

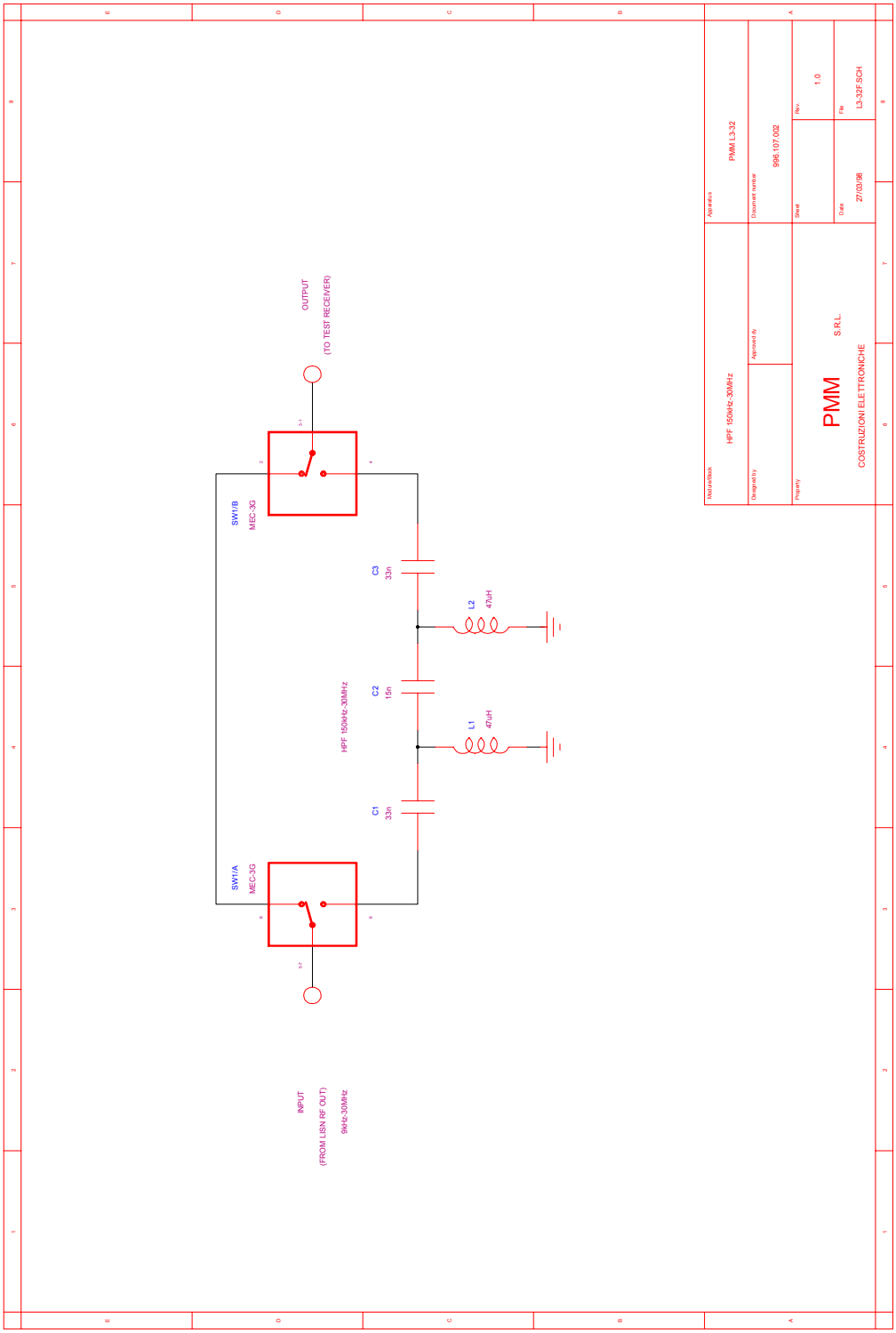


Fig. 2-4 Network schematic diagram

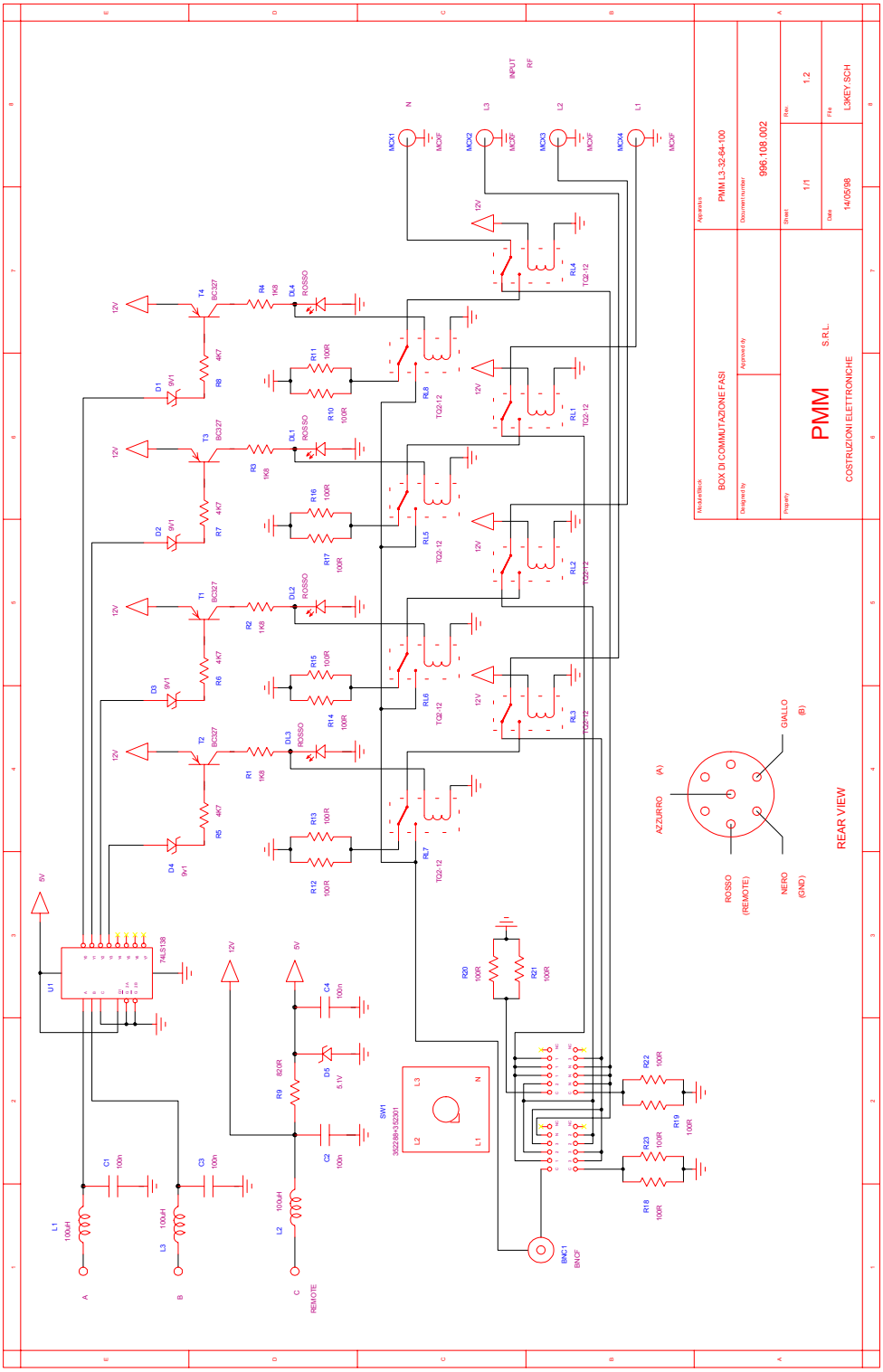


Fig. 2-5 Network schematic diagram

This page has been left blank intentionally

3 – PMM L3-64

Table 3-1 lists the PMM L3-64 Network performance specifications.
The following conditions apply to all specifications:

- The ambient temperature must be 0° to 40°.

3-1 Main specifications

TABLE 3-1 Main specifications PMM L3-64

Electrical characteristics	Performance Limits
Frequency range:	9 kHz to 30 MHz
Maximum rated output current:	63 A
Operating voltage:	400 Volt AC
Input mains frequency range:	DC - 60 Hz
Equivalent circuit:	50 Ohm // (5 Ohm + 50 μH)
RF output:	BNC female
Test item:	63 A connector
Rated temperature:	0° to + 40° C
Storage temperature:	- 25° to + 75° C
Overall dimension mm (W x H x D):	400 x 405 x 450
Weight:	50 kg

Document L3EN-70206 - © NARDA 2007

3-2 Front and Rear Panels

In Fig. 3-1 and Fig. 3-2 you can see front and rear connecting points and terminals of PMM L3-64 Network.

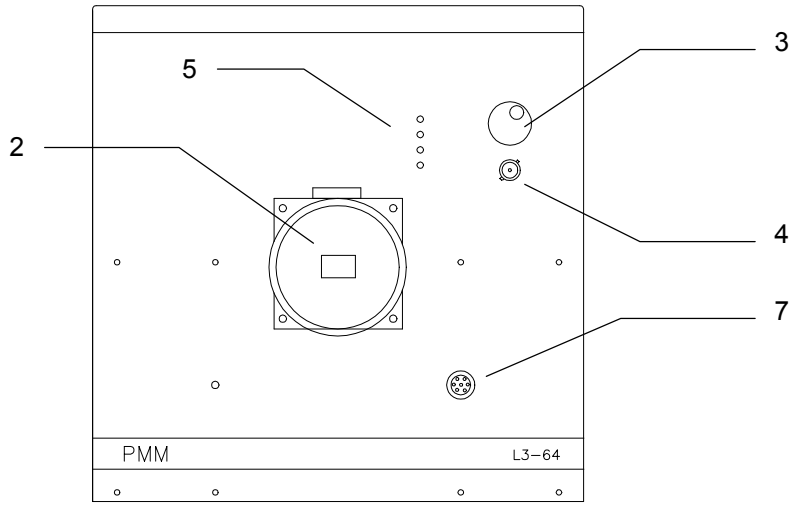


Fig. 3-1 Front Panel

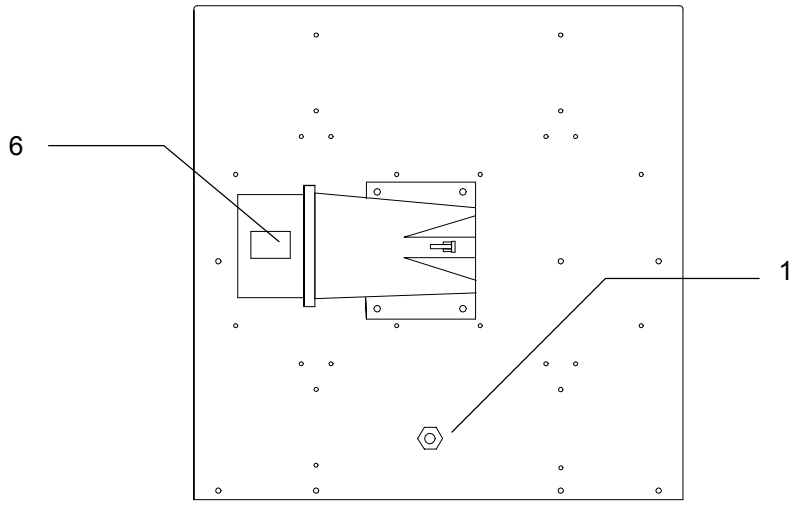


Fig. 3-2 Rear Panel

Legend:

1- Ground contact

2- Mains supply to DUT

3- Manual switch for phase under test (With PMM receivers the switch is disabled and the switching is automatic)

4- RF output to EMI Signal Analyzer (50 ohm, BNC female connector)

5- Line under test indicating led

6- Mains LISN supply

7- Remote PMM receiver control connector

3-3 Network schematic diagram

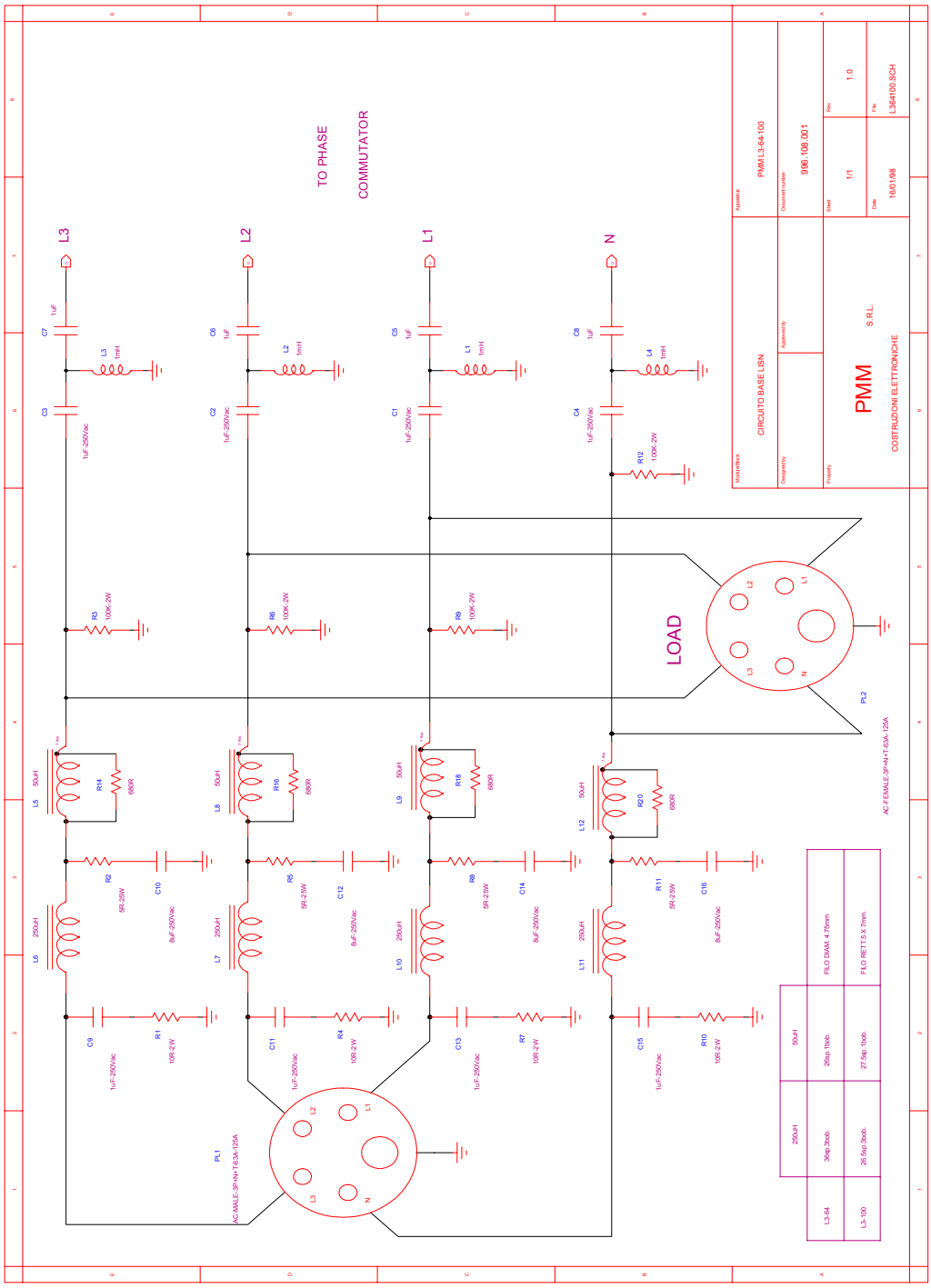


Fig. 3-3 Network schematic diagram

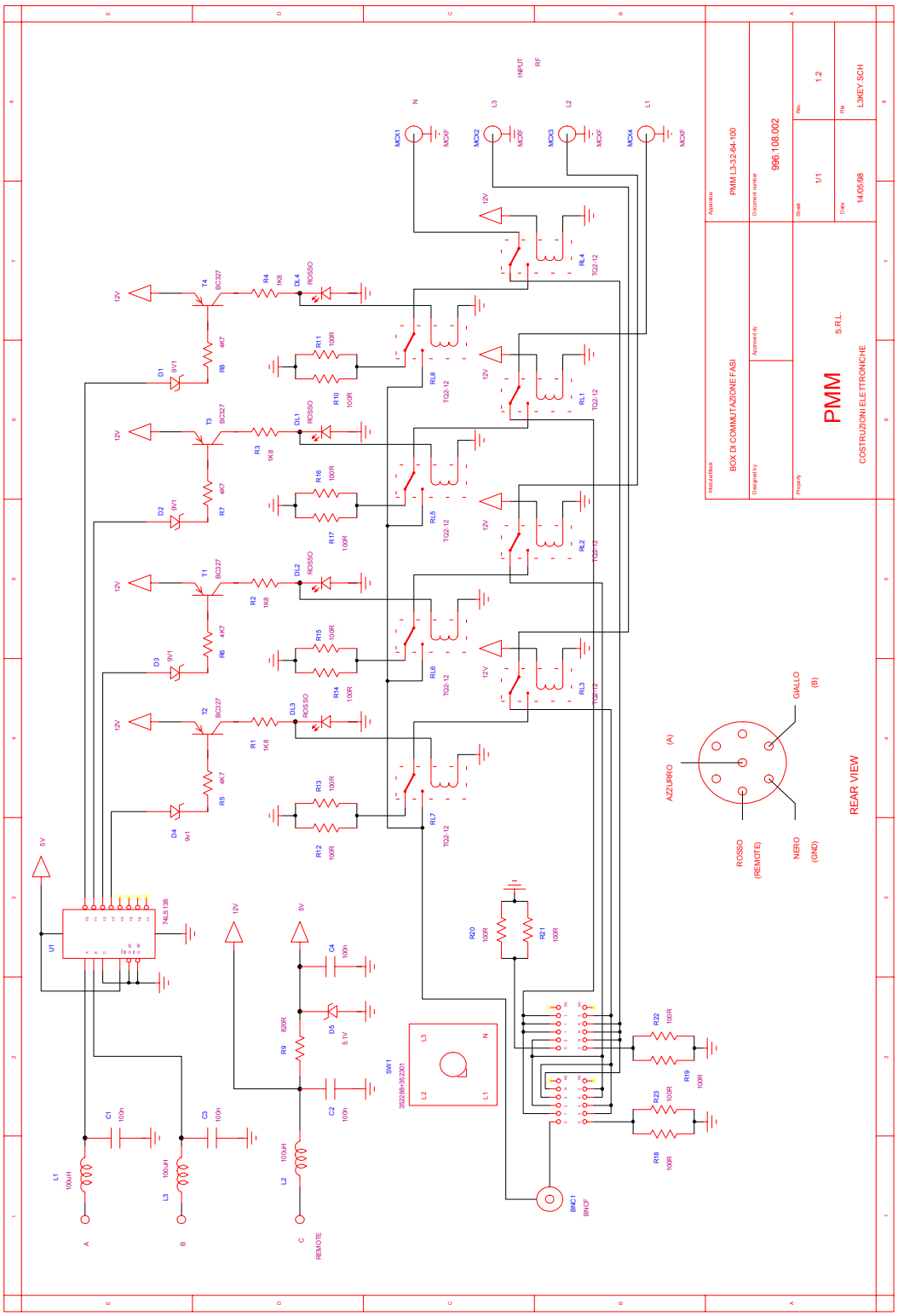


Fig. 3-4 Network schematic diagram

4 – PMM L3-100

Table 4-1 lists the PMM L3-100 Network performance specifications.
The following conditions apply to all specifications:

- The ambient temperature must be 0° to 40°.

4-1 Main specifications

TABLE 4-1 Main specifications L3-100

Electrical characteristics	Performance Limits
Frequency range:	9 kHz to 30 MHz
Maximum rated output current:	100 A continuous
Overload current:	125 A for 5 min.
Operating voltage:	400 Volt AC
AC supply frequency range:	DC - 60 Hz
Equivalent circuit:	50 Ohm // (5 Ohm + 50 μH)
RF output:	BNC female
Test item:	125 A plug and socket outlet according to IEC 309 standard
Rated temperature:	0° to + 40° C
Storage temperature:	- 25° to + 75° C
Overall dimension mm (W x H x D):	400 x 405 x 450
Weight:	70 kg
Gross weight	100 kg

Document L3EN-70206 - © NARDA 2007

4-2 Front and Rear Panels

In Fig. 4-1 and Fig. 4-2 you can see front and rear connecting points and terminals of PMM L3-100 Network.

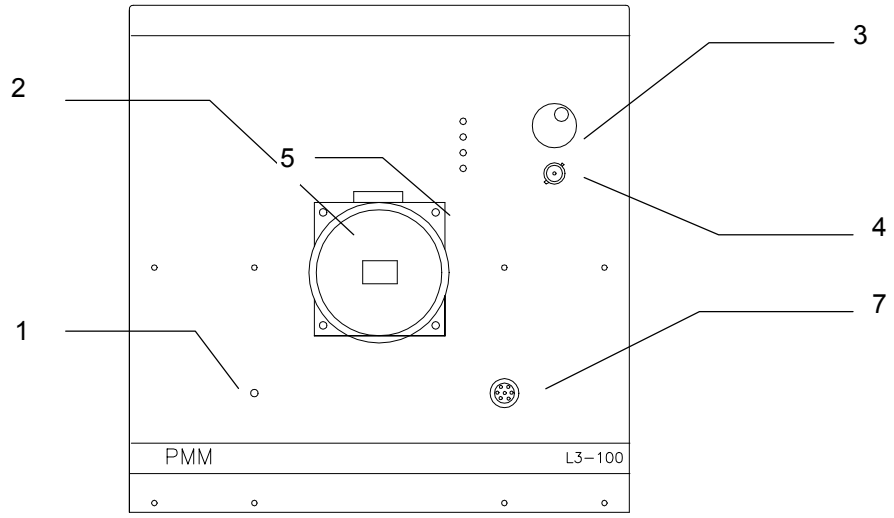


Fig. 4-1 Front Panel

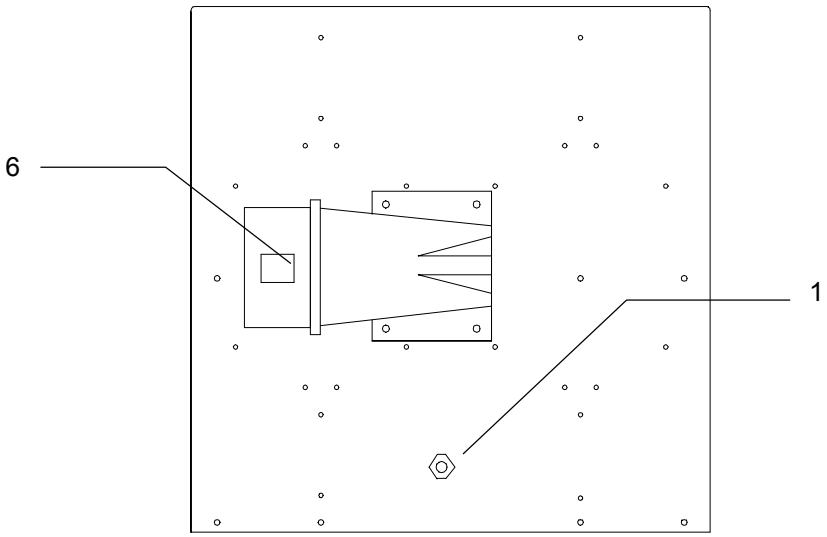


Fig. 4-2 Rear Panel

Legend:

1- Ground contact

2- Mains supply to DUT

3- Manual switch for phase under test (With PMM receiver the switch is disabled and the switching is automatic)

4- RF output to EMI Signal Analyzer (50 ohm, BNC female connector)

5- Line under test indicating led

6- Mains LISN supply

7- Remote PMM receivers control connector

4-3 Network schematic diagram

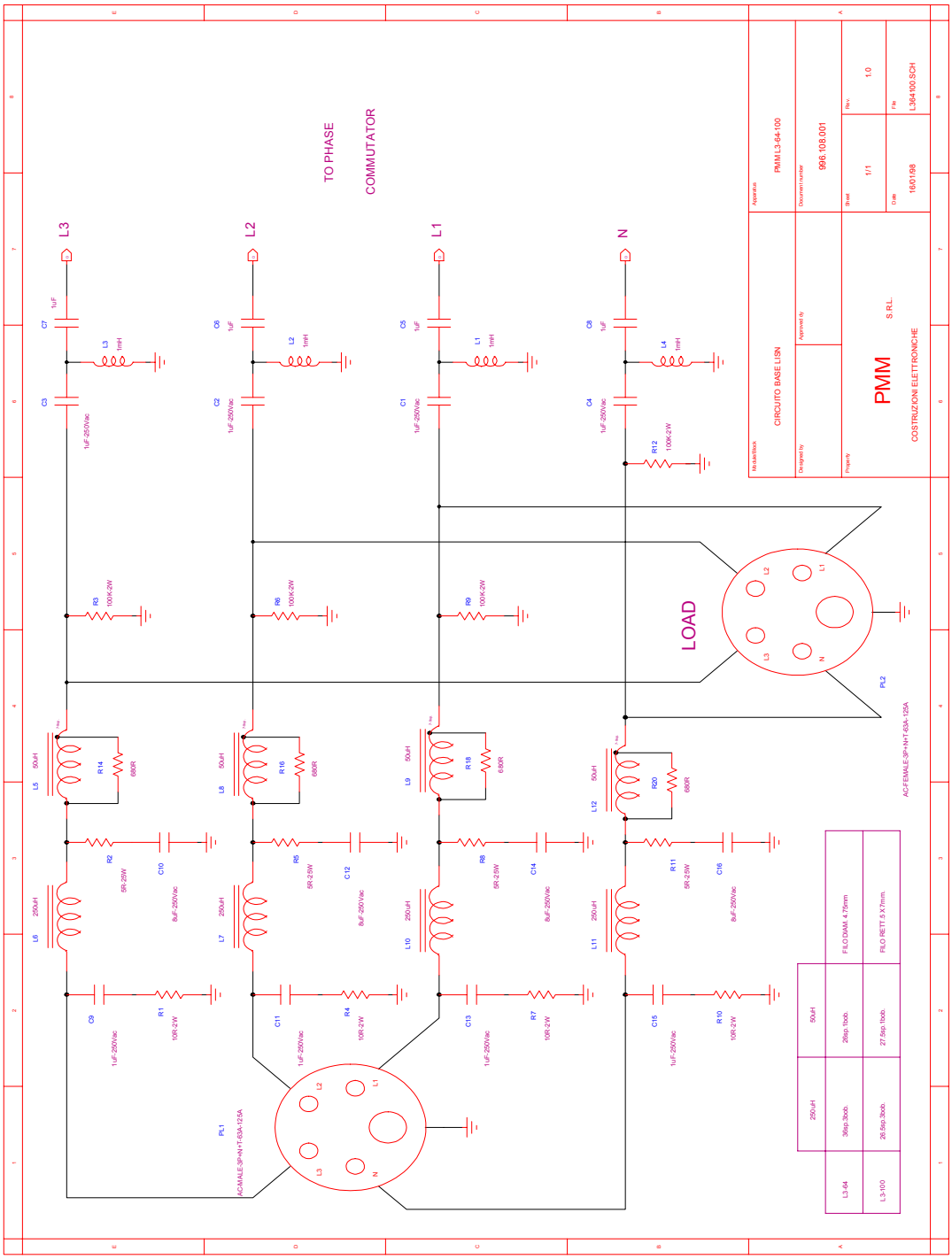


Fig. 4-2 Network schematic diagram

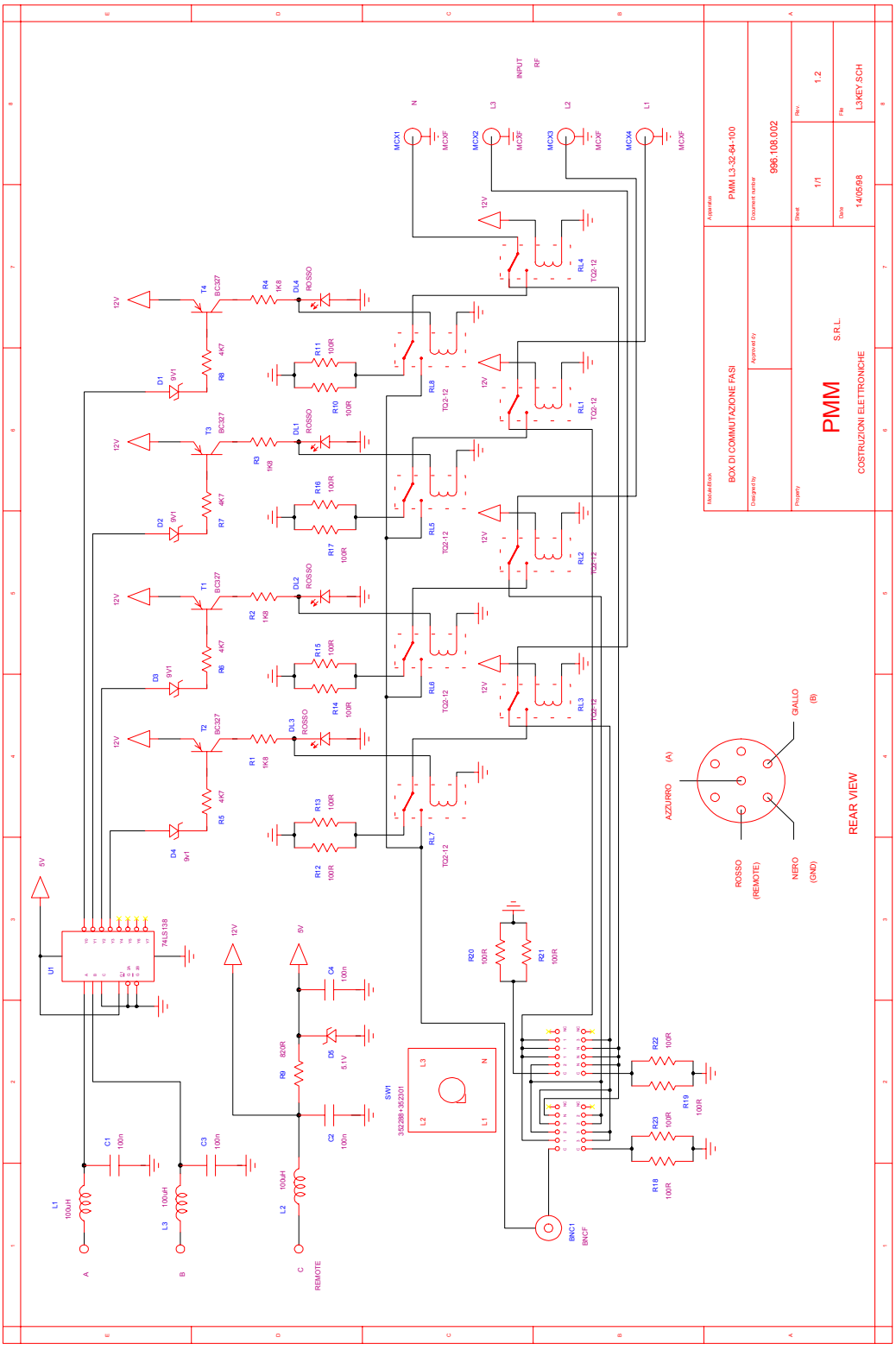


Fig. 4-3 Network schematic diagram

5 – PMM L3-500

Table 5-1 lists the PMM L3-500 Network performance specifications.
The following conditions apply to all specifications:

- The ambient temperature must be 0° to 40°.

5-1 Main specifications

TABLE 5-1 Main specifications L3-500	
Electrical characteristics	**Performance Limits**
Frequency range:	9 kHz to 30 MHz
Maximum rated output current:	500 A (20 minutes) 300 A (continuos)
Operating voltage:	400 Volt AC
AC supply frequency range:	50 Hz
Equivalent circuit:	50 Ohm // (5 Ohm + 50 μH)
RF output:	4 BNC female
Test item:	500 A bolts
Rated temperature:	0° to + 40° C
Storage temperature:	- 25° to + 75° C
Overall dimension mm (W x H x D):	555 x 1240 x 400
Weight:	210 kg

Document L3EN-70206 - © NARDA 2007

5-2 Front and Rear Panels

In Fig. 5-1 and Fig. 5-2 you can see front and rear connecting points and terminals of PMM L3-500 Network.

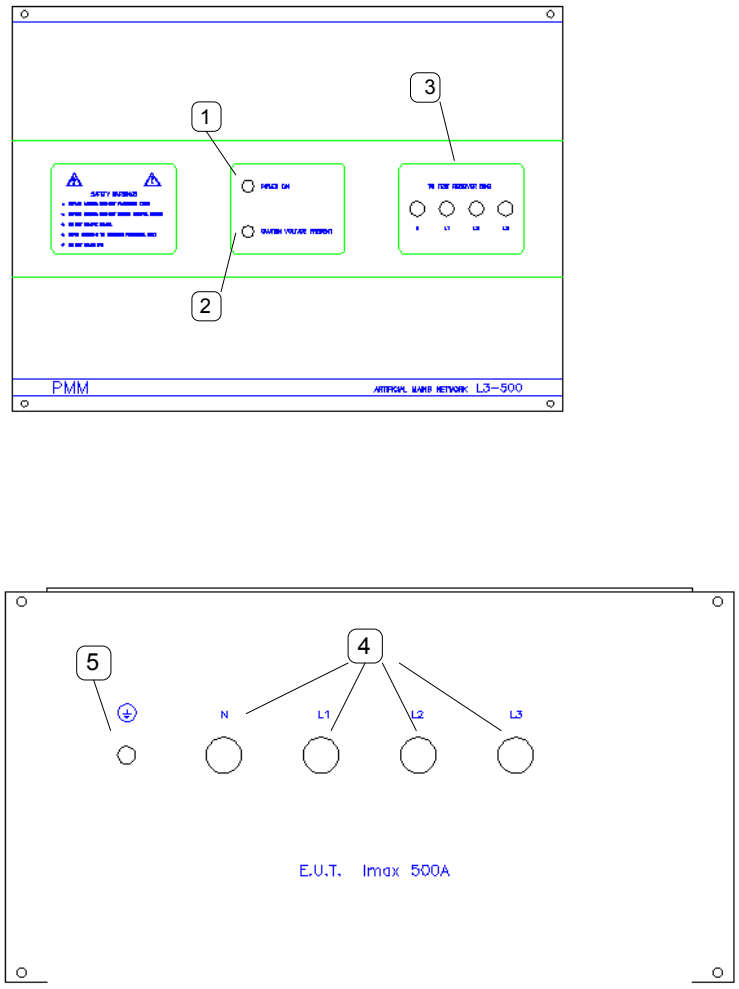


Fig. 5-1 Front Panel

Legend:

1- “power on” led

2- “voltage present” led

3- RF output to EMI Signal Analyzer (50 ohm, 4 BNC female connector)

4- Mains LISN supply, to EUT

5- Protective earth

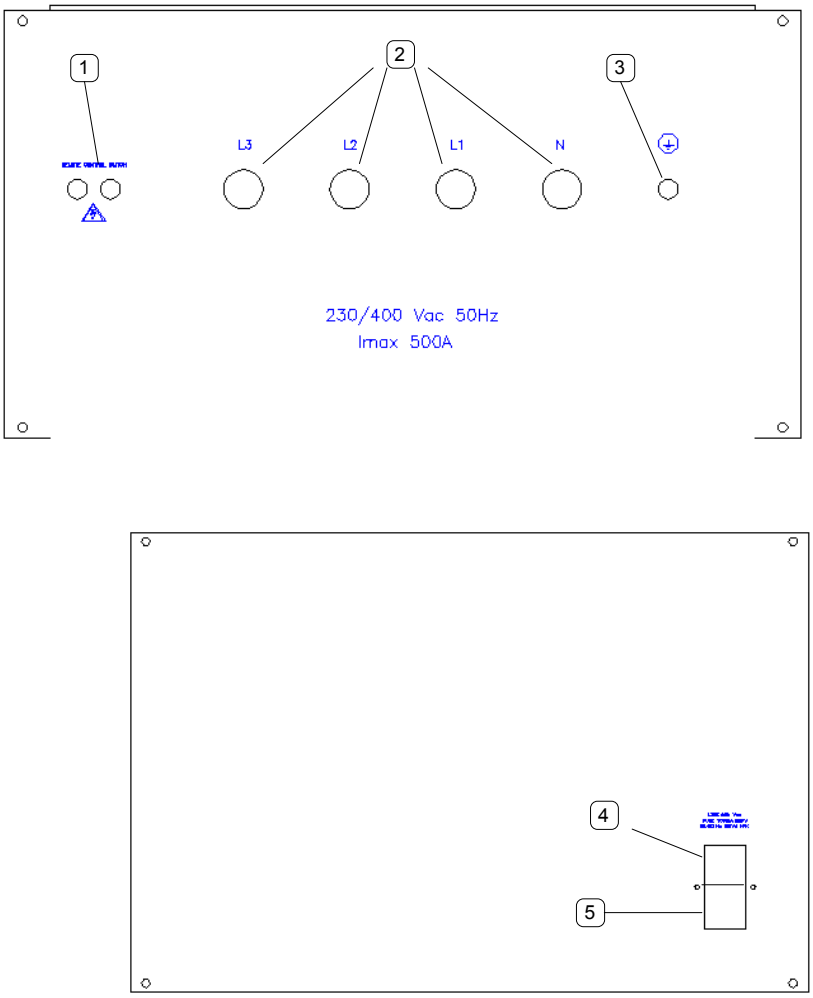


Fig. 5-2 Rear Panel

Legend:

1- Pilot circuit output

2- Mains LISN supply

3- Protective earth

4- Fan supply

5- Fan supply switch

This page has been left blank intentionally

6 - Installation

6.1 Introduction

This section provides the information needed to install the PMM LISN Network.

6.2 Initial inspection

Included is information pertinent to initial inspection, power requirements, interconnections, environment, instrument mounting, cleaning, storage and shipment.

To avoid hazardous electrical shock, do not turn on the instrument when there are signs of shipping damage to any portion of it.

6.3 Packing Unpacking

Inspect the shipping container for damage.
If the shipping container or cushion material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically.
Verify the accessories availability in the shipping container referring to the accessories check list enclosed with the Operating Manual.
Notify any damage to the carrier as well as the NARDA Representative.
To remove the LISN, open the wooden box and unscrew the four screws that hold the LISN at the bottom side of the palette.

Unit weight exceed 70 kg. To avoid hazard of personal injury use a suitable lifting device for PMM L3-100 Network handling.

Unit weight exceed 200 kg. To avoid hazard of personal injury use a suitable lifting device for PMM L3-500 Network handling.

Unit weight exceed 50 kg. To avoid hazard of personal injury use a suitable lifting device for PMM L3-64 Network handling.

6-4 Preparation for use

From the mains lines conductor to the case of the unit there is a high leakage current.
The mains lines conductor is connected to ground via high value capacitors due to the measurement system to be applied.

WARNING

Over current protection is not provided in the LISN. The LISN must be connected to a power mains which has the properly rated mains protection installed.

WARNING

The leakage currents between the phases and the earth line generally exceed permitted limits for typical environments due to internal capacitors; for this reason it is mandatory to use a current rated insulating transformer to supply the PMM LISN Network.

WARNING

PMM LISN Network, the insulating transformer and Equipment Under Test must be provided by an appropriate current rated contact breaker or fuses as closest as possible on the supply line and with a safety indication of equipment operated by.

6-5 Pilot circuit

According to EN 60309 (IEC 309) Normative, the industrial mains plugs and outlets, with an operating current, are provided with an auxiliary connector called Pilot Circuit contact.

NOTE

The Pilot Circuit contact is used to avoid mains plug disconnection with an operating high current load connected. In this case a current rated remote control switch shall be provided to allow a safe automatic mains disconnection.
The Pilot Circuit contact and the remote control switch, connected according to the following figure example, also allows to check automatically the protection earth conductor continuity till the Device Under Test mains connection.

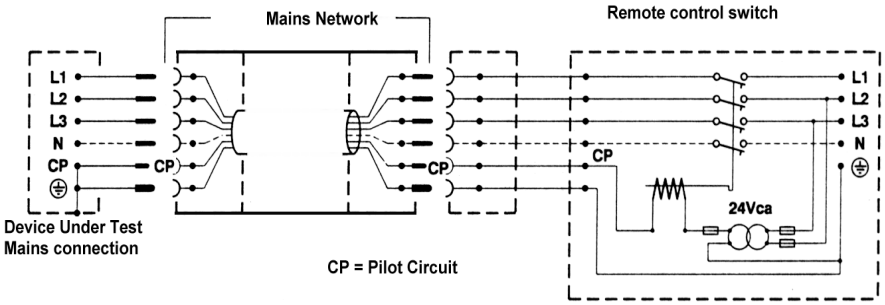


Fig. 6-1 Pilot Circuit connection example

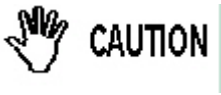
WARNING

This is a Safety Class I equipment, it is provided with a protective earth terminal. Before connecting this instrument, ensure that an uninterruptible safety earth ground is provided from the main power source to the product protective earth connection. If this instrument is to be connected to other equipment or accessories, prior to energizing either unit verify that a common ground exists between them. Any interruption or loosening of the protective earth ground conductor, either inside or outside the unit or in an extension cable will cause a potential shock hazard that could result in personal injury. Verify the safety earth ground functionality before operation.

6-6 Installation Check list

Before operation ensure the following steps are taken:

- Check the line voltage to ensure the compatibility with the equipment requirements.
- Ensure that the to be provided fuse or breaker current rating is appropriate for the equipment setup.
- Protection earth line is connected to mains supply input on the rear panel.
- Ensure that cables and terminals used to connect PMM LISN Network to supply line and to Equipment Under Test are suitable for the setup current rating and proper safety insulation.
- Verify that 50 ohm RF cable to the EMI Signal Analyzer input be disconnected before switch on or off the supply line.
- Prior to energizing either unit verify that a common ground connection exists between all equipment in the test setup and safety protection earth.



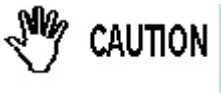
To allow correct equipment ventilation ensure that the vent grid on the equipment covers be free by any obstructing object.

This page has been left blank intentionally

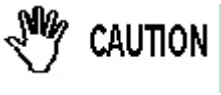
7 - Operating PMM Networks

7-1 Operating PMM Networks

To operate the PMM Artificial Mains Networks connect the IEC plug on the rear input to the mains insulating transformer.
To avoid any damage caused by transient current pulses, connect the RF cable to the receiver only after the AC supply has been switched on.
The Equipment Under Test should be connected to the D.U.T. connector.
To select the phase line to be tested operate the phase knob on the front panel, in this case there is no led indication.
Using PMM receivers the phase switching can be automatically performed; in this case the phase under test will be indicated by the led in the front panel.



To avoid any damage caused by transient current pulses, disconnect the test Signal Analyzer input before switching AC supply on or off



To allow correct equipment ventilation ensure that all the vent grids on the equipment covers be free by any obstructing object.
The PMM LISN continuous operation at higher current limit shall not exceed one hour, a rest period of at least a half hour shall be observed to allow the equipment to cool down.

Document L3EN-70206 - © NARDA 2007

7-2 Test Set-Up Considerations

Measurement repeatability is the main concern of standards and regulations, that exactly define the test set-up for interference measurements. The Artificial Mains Network complies with CISPR publ.16 (part 2), VDE 0876 and the American FCC part 15 rules and regulations.
The test SET-UPs required for various standards are largely identical; a detailed description is given in VDE 0877 part 1. (par. 9.2 "Measurements using LISNs").
The DUT has to be positioned on a non-metallic or conductive table (height >80cm.), 40 cm. in front of a metallic grounded wall with dimensions of at least 2 m. x 2 m.
The table may also be used inside a screened room.
The distance of the DUT from any metallic part may affect the measured RFI voltage values; VDE 0877 exactly define the dimensions for the test configurations, by means of the following drawing:

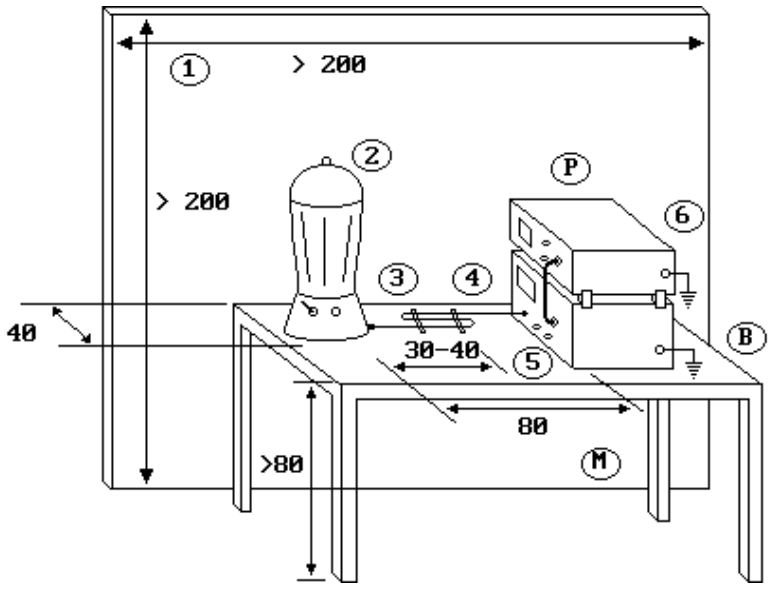


Fig. 7-1 Typical test set-up

The figure 7-1 describes the test configuration and the interconnection of a mains operated DUT, according to the above mentioned VDE specification, where:

1. Metallic grounded wall;
2. Device Undet Test (DUT);
3. Folded mains cable fixed with strips of adhesive tape;
4. Non-metallic table;
5. RFI measuring receiver;
6. Line Impedance Stabilization Network (LISN) with:
   B - connection to reference ground.
   P - jack for DUT.
   M - coaxial connection to measuring receiver.

All dimensions are given in centimeters.

Internal hardware checks and repairs shall be performed only by NARDA authorized assistance and service centers.

CAUTION

The manufacturer, the worldwide distributors and the national distributor agents shall not be responsible and kept liable for damages to goods, to instruments or persons caused during unauthorized operations on the instrument, or by manumitted instrument.

7-3 Network verification and maintenance

To verify proper operation of the PMM Networks use the following test procedure:

Do not connect any AC or DC supply to PMM Networks during this verification test.

Test equipment needed:

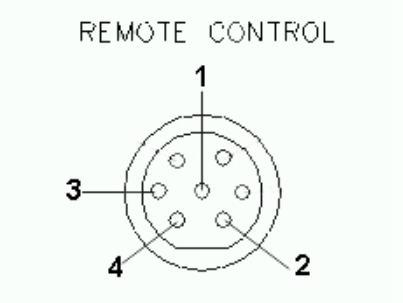
1. RF Generator and level measuring calibrated instrument or
2. Spectrum Analyzer with Tracking Generator.

In both cases, instrument shall be working at 1 MHz.

Verification test procedure:

1. Connect the RF signal (or tracking signal) to the mains output of L3-100 making sure that the ground is connected to the shield of the RF cable (grounded). The RF signal (or tracking signal) shall be taken to L1 and L2 sockets, alternatively
2. Connect PMM Networks RF output 3 to the level-meter input (or Spectrum Analyzer input).
3. Attenuation between generated signal level and measured level on output shall be less than 0.5dB at 1 MHz. If higher than 0.5 dB, please refer to qualified NARDA Service Center for maintenance of the unit.

7.4 Remote receiver control connector



Legend:

- 1 = (A)
- 2 = (B)
- 3 = (+12V)
- 4 = (GND)

Legend:

- 0 → GND
- 1 → +5V

A	B	MCX
0	0	N
0	1	L2
1	0	L1
1	1	L3

narda Safety Test Solutions
an L3 Communications Company
http://www.narda-sts.it

NARDA Safety Test Solutions S.r.l. Socio Unico

Sales & Support:
Via Leonardo da Vinci, 21/23
20090 Segrate (MI) - ITALY
Tel.: +39 02 2699871
Fax: +39 02 26998700

Manufacturing Plant:
Via Benessea, 29/B
17035 Cisano sul Neva (SV)
Tel.: +39 0182 58641
Fax: +39 0182 586400

Mod. 18-1

Caro cliente
grazie per aver acquistato un prodotto NARDA! Sei in possesso di uno strumento che per molti anni ti garantirà un'alta qualità di servizio. NARDA riconosce l'importanza del Cliente come ragione di esistenza; ciascun commento e suggerimento, sottoposto all'attenzione della nostra organizzazione, è tenuto in grande considerazione. La nostra qualità è alla ricerca del miglioramento continuo. Se uno dei Suoi strumenti NARDA necessita di riparazione o calibrazione, può aiutarci a servirla più efficacemente compilando questa scheda e accludendola all'apparecchio.
Tuttavia, anche questo prodotto diventerà obsoleto. In questo caso, ti ricordiamo che lo smaltimento dell'apparecchiatura deve essere fatto in conformità con i regolamenti locali. Questo prodotto è conforme alle direttive WEEE dell'Unione Europea (2002/96/EC) ed appartiene alla categoria 9 (strumenti di controllo). Lo smaltimento, in un ambiente adeguato, può avvenire anche attraverso la restituzione del prodotto alla NARDA senza sostenere alcuna spesa. Può ottenere ulteriori informazioni contattando i venditori NARDA o visitando il nostro sito Web www.narda-sts.it.

Dear Customer
thank you for purchasing a NARDA product! You now own a high-quality instrument that will give you many years of reliable service. NARDA recognizes the importance of the Customer as reason of existence; in this view, any comment and suggestion you would like to submit to the attention of our service organization is kept in great consideration. Moreover, we are continuously improving our quality, but we know this is a never ending process. We would be glad if our present efforts are pleasing you. Should one of your NARDA equipment need service you can help us serve you more effectively filling out this card and enclosing it with the product.
Nevertheless, even this product will eventually become obsolete. When that time comes, please remember that electronic equipment must be disposed of in accordance with local regulations. This product conforms to the WEEE Directive of the European Union (2002/96/EC) and belongs to Category 9 (Monitoring and Control Instruments). You can return the instrument to us free of charge for proper environment friendly disposal. You can obtain further information from your local NARDA Sales Partner or by visiting our website at www.narda-sts.it.

☑ **Servizio richiesto**: ☑ *Service needed*:

☐ Solo taratura ☐ Riparazione ☐ Riparazione & Taratura ☐ Taratura SIT ☐ Altro:
☐ Calibration only ☐ Repair ☐ Repair & Calibration ☐ Certified Calibration ☐ Other:

Ditta:
Company:

Indirizzo:
Address:

Persona da contattare: **Telefono:**
Technical contact person: *Phone n.*

Modello: **Numero di serie:**
Equipment model: *Serial n.*

☑ ***Accessori ritornati con l'apparecchiatura:*** ☐ **Nessuno** ☐ **Cavo(i)** ☐ **Cavo di alimentazione** **Altro:**
☑ *Accessories returned with unit:* ☐ None ☐ Cable(s) ☐ Power cable Other:

☑ ***Sintomi o problemi osservati:*** ☑ *Observed symptoms / problems*:

☑ ***Guasto*:** ☐ **Fisso** ☐ **Intermittente** ***Sensibile a*:** ☐ **Freddo** ☐ **Caldo** ☐ **Vibrazioni** ☐ **Altro**
☑ *Failure*: ☐ Continuous ☐ Intermittent *Sensitive to*: ☐ Cold ☐ Heat ☐ Vibration ☐ Other

Descrizione del guasto/condizioni di funzionamento:
Failure symptoms/special control settings description:

Se l'unità è parte di un sistema descriverne la configurazione:
If unit is part of system please list other interconnected equipment and system set up:

Suggerimenti / Commenti / Note:
Suggestions / Comments / Note: